Rare Plant Monitoring

Introduction

Shenandoah's rare plant monitoring program is based on a park- wide rare species inventory completed in 1993 by the Virginia Department of Conservation and Recreation (Ludwig et al., 1993). This inventory identified 39 Natural Heritage Resource Areas within the park. These Resource Areas contain rare plant communities, and concentrations of rare plant occurrences, and are the focus of the rare plant monitoring program.

The rarity of a plant is designated using a ranking system originally developed by The Nature Conservancy. This system uses a letter to designated the type of rarity "S" for state, and "G" for global, followed by a number from 1 to 5 that describes the level of rarity.

1 - Critically imperiled - Extremely rare (5 or fewer extant occurrences or very few remaining individuals) or some factor(s) make it especially vulnerable to extirpation or extinction.

2 - Imperiled - Rare (typically 6- 20 extant occurrences or few remaining individuals) or some factor(s) make it vulnerable to extirpation or extinction.

3 - Rare or uncommon - Typically 21- 100 extant occurrences; may be susceptible to large- scale disturbances, such as loss of extensive peripheral populations.

4 - Frequent to common - Greater than 100 occurrences: apparently secure but may have a restricted distribution or future threats may be perceived.

5 - Common to very common - Demonstrably secure and essentially ineradicable under present conditions.

Most of the rare plants in Shenandoah are considered state rare species. However, a few are also globally rare. There are currently 63 state- listed rare plant species in the park. Of these, only 5% (3 species) are globally rare (G2), while 84% (59 species) are globally secure (G4 or G5) but state rare (S1, S2).

Management Needs

Assuring the protection of rare plants through monitoring is important for a variety of reasons. First, and foremost, the presence of these species in the park is one of the values that makes the Northern Blue Ridge worthy of designation as a National Park. Second, these species contribute directly to the floral biodiversity of the regional and indirectly to faunal biodiversity. Third, most of these species are rare because they exist on the fringes of climatic, moisture, and substrate conditions that are conducive to their survival. Therefore, by definition they are sensitive indicators of environmental changes and can be used to detect change.

A rare goldenrod (Oligoneuron rigidum) on a west facing rock outcrop in evening light.

Current Procedures

The 63 rare plant species in the Park are represented by 381 monitoring populations each of which has been assigned a unique identification code. A park- wide system to organize location information and track monitoring records was initiated in 1998 and completed in 2003. The current Access database can accommodate all pre- existing and future rare plant monitoring records including Global Positioning System (GPS) location data.

The park performs general monitoring at each rare plant population once every five years. Certain populations such as those along Skyline Drive, or on rock outcrop areas are monitored more frequently or with greater intensity because of known threats. General monitoring begins with the collection of GPS location data, habitat descriptive information (elevation, aspect, slope, slope position), and a description of the surrounding vegetation (canopy/subcanopy/shrub/herb cover estimates and five dominant species). The population is then examined for any signs of disturbance, and assigned a percent value for age structure, phenology, vigor, and area covered. At this time, general monitoring data has been collected for approximately 80% of the Park's rare plant populations.

Extended monitoring is done whenever more information about a population is desired. The type of extended monitoring applied depends on the population

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characteristics, and is done within either a circular plot, line transect, or belt transect. Parameters may include plot / transect size; percent cover of herbaceous species; species, diameter at breast height, crown health, and crown class of canopy species; species and stem counts of shrub species; percent canopy cover measurements; and a density estimate for target species.

What We Have Learned

Unlike some of the larger monitoring projects in the park which apply lots of effort to study a relatively small number of sites. The rare plant monitoring project applies a smaller amount of effort to a greater number of sites. This approach is cost effective and ensures that rare plants, as inconspicuous and often small resources, are not forgotten and inadvertently damaged or lost.

There is often very little change at a rare plant population between monitoring visits. In these cases, monitoring simply serves to confirm that the plant is where we thought it was, and to document its status. Changes in a rare plant population may take place very slowly, and for this reason, good record keeping is essential for successful detection.

There have been several cases where rare plant monitoring has been used to document the response of a species of concern to a change in its environment. In the case of the forest herb twisted stalk (Streptopus amplexifolius), the hemlock overstory has been killed by the hemlock wooly adelgid, and we are monitoring the population to see if it can adapt to the change. It has been two years since the hemlock trees died (2002), and the plants continue to do well despite the extra light and new understory growth.

The rare plant monitoring program has also documented two clear cases of rare plants responding positively to fire. The first, sword leaved phlox (Phlox bucklii), was accidentally burned when a prescribed fire extended beyond its planned boundary. It took two years, but these plants rebounded to twice their original level.

The second example involves a grass- like plant called brown bog sedge (Carex buxbaumii) at Big Meadows. This species was known to respond positively to fire, so its population was included in several yearly prescribed burn of Big Meadows. The population doubled in size after four years of Spring burns, had increased vigor, and was producing numerous seed heads.

At other times, the primary role of rare plant monitoring is to protect rare plant populations that may be threatened by park or visitor activities. Examples of this include the before and after monitoring of rare plants adjacent to vista clearing zones treated with herbicide to ensure no damage. And the frequent monitoring of rare plants within the mowing zone of Skyline Drive to ensure that they are not damaged by construction projects, or mown to often or at the wrong time of year.

References

Cass, W.B. 2002. Rare plant general monitoring site visit protocol. Shenandoah National Park internal document.

Cass, W.B. 2002. Rare plant extended monitoring site visit protocol. Shenandoah National Park internal document.

Ludwig, J.C., G.P. Fleming, C.A.Pague, and T.J. Rawinski. 1993. A Natural Heritage Inventory of Mid- Atlantic Region National Parks in Virginia:Shenandoah National Park. Natural Heritage Technical Report #93- 5. Department of Conservation and Recreation Division of Natural Heritage, Richmond, Virginia.

Park staff monitoring a rare plant (Phlox buckleyi) site.